

UNIVERSITY OF FLORIDA
GAINESVILLE, 32611

1603 NW 7th Pl.

32603

DEPARTMENT OF ZOOLOGY
223 BARTRAM HALL
904-392-1107

Dec. 2, 1983, 10 p.m.

Dear Hildegard,

I had hoped to have returned your MS, etc., before now, but this is a horrible time of the year for those of us who are teaching. This week-end will be devoted to reading illiterate ^{undergraduate} term papers. If I finish in time without going stark ^{having} mad, I will do the much more interesting review of your Fulmarus MS.

It looks good. But I want to compare it with more species than you have done, and have brought home all my skeletons of Procellariidae, as it seems you were a little uncertain that it was really a Fulmarus. I have skeletons of all the genera of the family and most of the species, world-wide.

One thing that struck me, in reading your MS, was the emphasis on Calif. species, while those ^{species} ~~birds~~ today have often a distribution, almost from pole to pole, and ^{many of them occur} in the Atlantic as well as in the Pacific.

I realize that you are submitting this to the So. Calif. Acad., but ^{I hope} this does not mean, necessarily, that your n. sp. is provincial. Perhaps you can educate some of the members of the SCAAS.

Now in regard to the name of your new species - you ask if it should be micenus or micenum. ~~PTO~~

My answer is neither, for the following reasons.

- 1) Fulmarus is a made-up word by Stephens, Latinizing the Engl. word fulmar. The latter in turn is not a Classical Latin or Greek word, but ~~this~~ is derived from the Norse or Gallic fulmar for the local Atlantic species.
- 2) By giving it the -us ending, he puts it in the 2^d declension in Latin, so the genus must be of masculine gender.
- 3) In Classical languages (as in most languages today except English) an adjective must agree in gender with the noun it modifies.

4) miocenium is OUT. — as it has a neuter ending (um).

5) Furthermore, both miocenus and miocenum are wrong,

~~the~~ etymologically, for the following reasons, to wit:

a) The "cene" part, meaning "recent", is derived from the Classical Greek ^{Kainos} ~~Kainos~~ ^{κῆνός} ~~κῆνός~~ (in English or Lat. they ^{V = n} V = nu)

b) When transliterated into Latin characters, this becomes caenus if masculine. (from kainos)

c) Ergo, the correct spelling of your specific name should be miocaenus.

6) all other authors in ornith., & probably in other areas, have transliterated it in the ^{correct} ~~same~~ way, except that stupid Shufeldt (who did more than anyone else to harm paleornithology) & who always transliterated or transposed the ae to miocceanus, oligocceanus, etc.

I hope you are not angry at me, but I don't want to see you make such a mistake. I had 4 yrs. of Latin, & 3 of Greek; also 4 of German & 3 of French, as we had to pass the exams for the Ph.D., & I can pick out all the W. European languages & Russian, & am fluent in Spanish self-taught.

Until next week,

Yours,

Reich

If all goes well, will write next week.

Please don't be angry.

Regards to Henry.

PIERCE BRODKORB
1603 NW. 7 PLACE
GAINESVILLE, FLA.
32603



Dr. Hildogarde Howard
2045-Q Mariposa East
Laguna Hills CA 92653

Brashers
comments
referred to here
Oct 1 Jan 22, 1964

I certainly appreciated your call this afternoon.
By way of assuring you that I will heed your valuable
comments, let me repeat here the changes and actions to
be made and taken:

- A Page 1 and throughout-- Fulmarus miocaenus
- B Page 2 F. glacialis rodgersii
- C Page 3 line 3-- add on the anconal surface,
- D Page 5 ~~before~~ of the shaft immediately below the head
Contact Clayton^{new} at USNM to borrow Wetmore's
"Fulmarus sp." from the Miocene of Maryland
- E Specimens of various species compared--check with
Schreiber--will do on Thursday.
- F Check Larus raemdonckii Van Beneden holotype, a photo
of which (drawing) you are sending. I failed to
get, however, where you listed it in your Catalogue.
I found no reference to it under the Laridae.
Oh, oh, -- I found it! with the Procellariidae, listed
as Puffinus raemdonckii (Van Beneden). I looked up
your comment about it in the Auk (1962, p. 707).
Your description of it as having a "strongly rotated
distal end" is certainly more like Puffinus than
Fulmarus, so I doubt that I need worry about it
bearing resemblance to F. miocaenus. However, I will
give careful attention to the photo.

Again, many thanks for your valuable suggestions.

Sincerely (I mean it!)

photos
never
sent
no war
ms returned
(on photos)

2045-Q Via Mariposa East
Laguna Hills, Calif. 92653
February 3, 1984

Dr. Clayton E. Ray
Department of Paleobiology
N H B E-106, Mail Stop 121
National Museum of Natural History
Washington, D.C. 20560

National
Museum

Smithsonian Institution

(phone

(202) 357-2052

Dear Clayton:

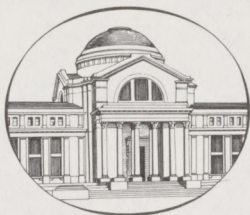
I am about to describe a new species of Fulmar from Sharktooth Hill, and Pierce Brodkorb thinks I should see the fragment of humerus recorded by Wetmore presumed to be of Miocene age, and marked "S. Chesapeake Beach, Maryland, July, 1908, Wm. Palmer."

My type is a humerus, and is apparently much smaller than the Maryland specimen, but if you can find Wetmore's specimen and would be good enough to lend it to me (through the L.A. County Museum of Natural History), I will be grateful. I enclose a xerox of the title of the paper and the section dealing with the Fulmar bone.

Sincerely,

Hildegarde Howard

My address at the L.A. Museum is the same as Larry Barnes'



Address for Purdy
NHB/E207/MRC/NAB/121

National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202-

February 13, 1984

Dr. Hildegarde Howard
2045-Q Via Mariposa East
Laguna Hills, California 92653

Dear Dr. Howard:

Clayton asked me to reply to your letter of February 3. Upon searching the collections I found that the specimen, which is uncatalogued, is missing; possibly Storrs Olson may have it in his study collection, which includes many specimens Dr. Wetmore had kept in his office; however, Storrs is in Hawaii until the middle of next month. As soon as he returns, I will ask him about the specimen, if this is not too late for your needs.

Clayton also asked me to mention that this specimen may come from the Pleistocene rather than the Miocene. Since we do have Palmer's cross section of the site in watercolors, I plan to ask Dave Bohaska, who is very well-informed in the stratigraphy of the Chesapeake Bay area, for his opinion as to the age of the yellow stratum near the top of the section south of Chesapeake Beach. As soon as Dave and I can get together, I will pass the information on to you.

With best wishes,

Sincerely yours,

Robert W. Purdy

Robert W. Purdy
Museum Specialist
Dept. of Paleobiology

cc: D. Bohaska
C. E. Ray

2045-Q Via Mariposa East
Laguna Hills, CA 92653
March 18, 1984

Dr. Storrs L. Olson
Department of Birds
National Museum of Natural History
Smithsonian Institution
Washington, D.C. 20560

Dear Storrs:

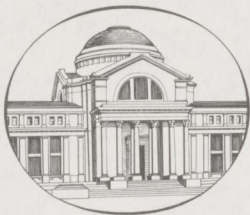
About a month ago I wrote to Clayton Ray asking to borrow the fragment of humerus Wetmore assigned to Fulmarus sp. (1926, Auk 48(4):464), which was said to be of Miocene age and carried the data "S. Chesapeake Beach, Maryland, July 1908; Wm. Palmer. From yellow stratum above." Pierce suggested I see it in regard to my paper on Fulmarus n. sp. from Sharktooth Hill.

Enclosed is a xerox of the reply I received (from Purdy) in answer to my letter to Ray. Having just received a packet of reprints from you, I gather you have returned from Hawaii. So, by chance, has this subject come to your attention? If you have seen the specimen (which I gather from the description can be scarcely an inch in length), to you think it important that I should see it? I enclose a xerox of my diagnosis of Fulmarus miocaenus. Also I wonder now about the age of the Maryland bone. Anyway, I would like to save USNM the bother of shipping if in your opinion it bears no similarity to my species.

Regarding the loan (six-month) of the Procellariid material from USNM, which I received late in August 1983, I would like to hang on to the bones until my paper is handed over to the printer. The LACM lab keeps finding more bird bones in the Sharktooth Hill matrix. They gave me what appears to be the femur (very incomplete) of Osteodontornis last week. What next?

Best wishes

Hildegarde Howard



National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202-

16 March 1984

Dr. Hildegarde Howard
Department of Vertebrate Paleontology
Los Angeles County Museum of Natural History
900 Exposition Boulevard
Los Angeles, California 90007

Dear Dr. Howard:

According to our records, your loan of bird specimens on our invoice number 353345, made to you on 11 August 1983, has recently expired. This loan consists of seven petrel skeletons.

If you have completed your work with these specimens, we would appreciate their return at this time. If, however, you are still actively using them, you may request an extension. In either case, please fill out the enclosed card and drop it in the mail as soon as possible. Thank you.

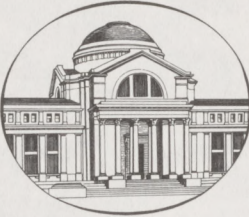
Sincerely,

Katherine L. Pruitt
Division of Birds

ENCLOSURE

*Reid card "still using - will return
by July 1, 1984."*

March 29, 1984



National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202-

29 March 1984

Dr. Hildegarde Howard
2045-Q Via Mariposa East
Laguna Hills, CA 92653

Dear Hildegarde,

I am sorry you have been so long getting a reply regarding the putative specimen of "Fulmarus" from the Calvert Formation; no one from VP mentioned to me that you had written about this while I was away in Hawaii. I know the specimen well and it is a pity that it has been cited in the literature as frequently as it has because it is essentially unidentifiable and most probably misidentified. Even James Fisher in his book The Fulmar mentions this specimen, which may be worth calling to attention. By itself, the correction of this minor error would not be worth publishing, so you are free to quote me to any extent you wish.

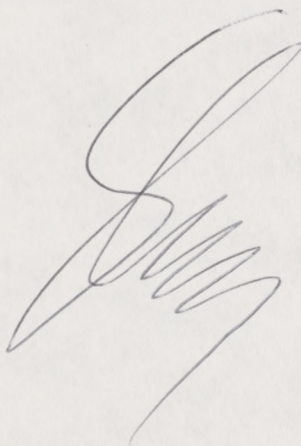
Despite Wetmore's having published on the specimen, which is only a worn fragment of shaft preserving the distalmost part of the scar for M. pectoralis, it had not been cataloged until I ran across it a few years ago and gave it the number USNM 237160. It appears to have been beach-washed and if found in place it was probably redeposited. From its coloration and preservation there would be no reason to assume it to be anything other than Miocene. The specimen preserves no diagnostic features and by itself could only be referred to as "Procellariidae, gen. & sp. indet.". On the grounds of probability, however, it is almost certainly from some species of Puffinus. We now have at least two dozen other bones of Procellariidae from the Calvert Formation in Maryland and Virginia, and some hundreds from equivalent age and early Pliocene deposits at Lee Creek, North Carolina. All of these specimens of Procellariidae are from a variety of species of Puffinus and USNM 237160 cannot readily be distinguished from some of these. On the basis of the rather extensive fossil sample now at hand, there is as yet no evidence of the genus Fulmarus in the Neogene of the Western North Atlantic and USNM 237160 certainly cannot be cited as such.

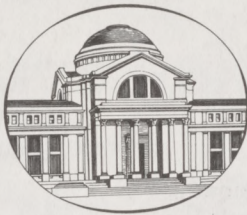
If you wish to borrow the specimen anyway you are most welcome to it, but to be quite honest I think it would be a waste of time. Go ahead and keep the skeletons until your paper goes to the printer and if you get a dunning notice from the technicians just ignore it. You do have our only cleaned specimen of Halobaena but I don't think I will be needing it soon. I did get in another fossil procellariid humerus from South Africa but I am sure it is not Halobaena. In your diagnosis of F. miocaenus you speak of the "height" of the ectepicondylar prominence above the distal end, which is clear enough on the second reading but at first glance might cause one to think you are referring to how far it sticks out from the shaft. Perhaps it might be better to say the "distance" above the distal end or some such thing. Also, I was not aware that there was any material of Fulmarus hammeri other than the holotypical carpometacarpus. Is this discussed elsewhere in your paper I assume?

Very best wishes,

Storrs L. Olson

P. S. I had to open the envelope to insert this comment because in putting back the skeleton of Fulmarus that I was comparing with the Calvert fossil, I chanced to compare it with the new fossil from South Africa (the distal end of a humerus). The African specimen would seem to be very close to Fulmarus in fact, although a good bit smaller. It is slightly larger than F. miocaenus (1 mm wider in distal width), but not a great deal, although the ectepicondylar spur seems more proximally located. The problem with this specimen is that it is from a new locality about which I have not yet been given any information. It was taken along with remains of at least two species of penguins and the site is not far from Langebaanweg, so I assume that the bone is probably early Pliocene in age. I shall have to work some mention of this specimen into my paper on the Procellariidae of Langebaanweg as soon as I get some stratigraphic information. Do you want to do anything about this at this point? You could just say that I have informed you that a bone possibly of Fulmarus (a small one) or a closely allied form has been taken in the Neogene of South Africa. I will let you have more details as soon as I get them myself.

A handwritten signature in dark ink, consisting of a large, stylized capital 'S' followed by a series of loops and a long, sweeping underline.



National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202-

2045-Q Via Mariposa East
Laguna Hills, CA 92653
April 7, 1984

Dr. Storrs L. Olson
Devision of Birds
National Museum of Natural Hisotry
Smithsonian Institution
Washington, D.C. 20560

Dear Storrs:

Thank you so much for your good letter of March 29.

Following is what I now plan to say about the Maryland specimen. It will appear as "Discussion" following the diagnosis of F. miocaenus:

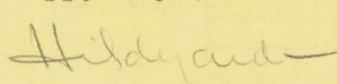
The Maryland record of Fulmarus sp. (Wetmore 1926) is based on a fragment of the shaft of a humerus (USNM 237160) between the nutrient foramen and the lower half of the pectoral crest. It was placed in the genus Fulmarus on the basis of the high elevation of the nutrient foramen and general similarity and size with respect to the humerus of F. glacialis. The size alone would, seemingly, preclude referral to F. miocaenus. Furthermore, according to Storrs Olson of USNM, who examined the fragment for me, the specimen preserves no diagnostic features that could be used in comparison with the holotype of F. miocaenus, and should probably now be classified only as "Procellariidae, gen. and sp. indet."

I have measured the humerus of F. miocaenus just below the end of the pectoral crest and find the breadth of shaft to be 5.0 mm and the depth of shaft at the same place 4.0 mm. If it would be possible to make the same measurements on USNM 237160 that would clarify the size, but I think your comments about the specimen would really suffice. (as I have included above). I certainly don't see any necessity of sending me the specimen.

Regarding the humerus of F. hammeri--a fragment of the external side of the distal end was found in the type locality and was included as a referred specimen in the type description. I am able to measure both the depth of the external condyle and the height of the ectepicondylar prominence above the distal end of the humerus. Incidentally thanks for your comment about clarifying "height above the distal end of the humerus," or use distance instead of height.

Regarding the Fulmar bone from South Africa--thanks for telling me of it, but I'm about ready to hand my manuscript over to the editor and I'll let you decide and publish on the South African bone.

Happy days,


Hildegard Howard

B 27

618

612

620

6.3 5.0

6.3 4.8

6.1 5.0

6.4 5.2

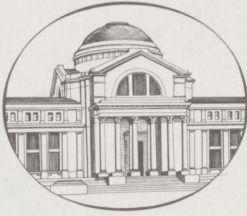
humerus (ratio of height of prominence above distal end of humerus to breadth of distal end, 82 percent, as compared to 92-95 percent in F. glacialis and 102 percent in F. glacialoides). Distinguished from humerus of Miocene species F. hammeri, by smaller size (distance from distal end of humerus to base of ectepicondylar prominence 7.8 mm, depth of external condyle 5.8 mm; same measurements in the humerus of F. hammeri 13.0mm and 9.1 mm respectively).

Measurements compared with living species of Fulmarus: Table 1.

Discussion.-- the Maryland record of Fulmarus sp. (Wetmore 1926) is based on a fragment of the shaft of a humerus (USNM 237160) between the nutrient foramen and the lower half of the pectoral crest. It was placed in the genus Fulmarus on the basis of the high elevation of the nutrient foramen and general similarity and size with respect to the humerus of F. glacialis. Thus size, alone, seemingly would preclude referral to F. miocaenus. Furthermore, according to Storrs Olson of USNM, who examined the fragment for me, the specimen preserves no diagnostic features that could be used in comparison with the holotype of F. miocaenus, and should probably now be classified only as "Procellariidae, gen. and sp. indet."

Size alone precludes referral to F. miocaenus: breadth of shaft immediately below the pectoral crest F. miocaenus 5.0, depth of shaft at the same place 4.0; the same measurements on USNM 237160 according to Storrs Olson, who examined the fragment for me, are respectively -- close to the minimum -- 5.8 and 4.7; measurements of F. glacialis humeri, breadth 5.3-6.5 mm, depth 4.8-5.2mm measurements of humeri of Recent of F. glacialis breadth maximum 6.5, minimum 5.5; depth maximum 5.2, minimum 4.8 mm.

max 6.5 (br.) 5.5 (depth); min. 5.3 br., 4.7 depth



National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202-

16 April 1984

Dr. Hildegarde Howard
2045-Q Via Mariposa East
Laguna Hills, CA 92653

Dear Hildegarde,

The breadth and depth of the shaft of USNM 237160 just distal to the pectoral crest are 5.8 and 4.7 mm respectively. Will your paper on Fulmarus miocaenus be in the LACM Contributions? and would it be possible for me to have a copy of the final MS for the purpose of citing in my South African paper?

Best regards,

Storrs L. Olson
Curator, Division of Birds

2045-Q Via Mariposa East
Laguna Hills, Calif. 92653
May 1, 1984

Dr. Storrs L. Olson
Division of Birds
National Museum of Natural History
Smithsonian Institution
Washington, D.C. 20560

Dear Storrs:

Thank you for the measurements of the Maryland fragment. I added them to the manuscript and handed the paper over to the editor of the Bulletin of the Southern California Academy of Sciences who had previously accepted it for publication. (It's too short for LACM Contributions ~~and~~ Science). It's on its way now to Allen Press to be published either in the April 1985 issue (vol 84, no. 1) or December 1984 issue (vol. 83, no. 3).

The xerox you requested is enclosed. The photos of Fulmarus n. sp. will be trimmed and placed side by side on the page when printed. I xeroxed them before mounting. We decided not to reduce them to natural size. The characters show up better when enlarged.

If there is anything you recommend changing there should be plenty of time to do so in galley proof. For example, the listing of Osteodontornis among the additional Museum specimens from Sharktooth Hill, new to the record. You refer to this also in your Avian Biology paper which will probably be published about the same time. Should we each refer to the other in a footnote? We now have seven fragmentary specimens of Osteodontornis from the Bonebed, and I would like to include the record here.

All goodwishes. And again many thanks for your help concerning Fulmarus. I will try to get the modern skeletons returned to USNM very soon now.

Sincerely,

Hildegarde Howard



1-904-372,8159

Change Miocaenus

change Fulmar rodgersii

Write Clayton Ray Dept Palmer
USNM

to borrow Fulmarus

of Wetmore from
Maryland.

Check for Fulmarids
in Schreiber's collection

Inventory of sub skeletons of the
world 1982 Blue cover

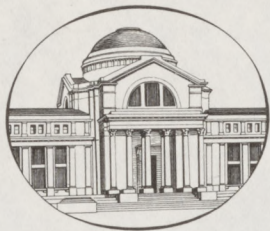
18x14" World Inventory of avian
skeletal specimens 1982

Continued New + Marian

Miscellaneous Naem doncki Van Beneden
Larus naemdoncki ~~laebs~~ 1871

like Fulmar Belgium

send photo of the drawing



National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202- 10 Aug 1983

Dr. Hildegarde Howard
2045-Q Via Mariposa East
Laguna Hills, CA 92653

Dear Hildegarde,

Yours of the 1st with the photographs arrived yesterday. Your new fulmarine looks very interesting indeed and it is good to see some procellariid genera other than Puffinus beginning to appear. As it is probably not sufficient just to compare the fossil with Puffinus and Fulmarus, I am sending you skeletons (c/o LACM) of the other Fulmarinae for examination (Daption, Thalassoica, Halobaena, Pachyptila, Pagodroma, Fulmarus glacialoides). I also included a specimen of Pterodroma just in case you don't have one on hand, although your fossil is pretty clearly not a Pterodroma. It appears as though the proximal edge of the deltoid crest is pretty deeply incised, making the apex come to a very sharp point, which also occurs in Halobaena and Pachyptila, although in both those genera the ectepicondylar spur is much blunter and deeper.

I have a manuscript nearly finished on the early Pliocene Procellariiformes from Langebaanweg in South Africa; this includes descriptions of a new species of Pelagodroma (=Oceanites), the first Tertiary record of the Pelecanoididae, and a new giant species of Pachyptila. I hope to have this ready to send to you for comments in a few weeks.

I am returning your fulmar MS, as it appears to be your original copy. It sure is wonderful that you are able to keep at it and get the Sharktooth Hill material worked up. I only wish we had more like you.

Best regards,

Storrs L. Olson
Curator, Division of Birds

rec'd by HT
FY03 Aug 25 '83

Letter has not been written

353345

August 11, 1983

6 months

S. L. Olson

Division of Birds

G. E. Watson
supervisor

Department of Vertebrate Paleontology
Los Angeles County Museum of Natural History
900 Exposition Blvd.
Los Angeles, California 90007

Attn: Hildegard Howard

(2) Loan at your request: SKELTONS

554703	✓	<i>Pachyptila v. vittata</i>	USNM 554703	New Zealand
489493	✓	<i>Daption capense</i>	" 489493	♀ Sheblaud Ids Cape Petrel "✓
553244	✓	<i>Halobaena caerulea</i>	" 553244	So. Atlantic, EL Schel, S. Georgia
489516	✓	<i>Thalasseica antarctica</i> <i>Slender-billed Fulmar</i>	" 489516	So. Atlantic Ocean Weddell Sea ♂
556902	✓	<i>Pterodroma phaeopygia</i>	" 556902	Hawaii ♀ "Dark rumped Petrel" ✓
502506	✓	<i>Papodroma nivea</i>	" 502506	♂ Ross Sea 76° 11'S, 169° 01'E
491469	✓	<i>Fulmarus glacialisoides</i>	" 491469	Brazil ♀ = "Slender-billed Fulmar" ✓

TOTAL NUMBER OF SPECIMENS: 7

Packed by: J. F. Bean
Insured for: \$100.00

32331606-3370-F30000-52200

1

Best Way

Prepaid

A NEW SPECIES OF FULMAR (AVES: PROCELLARIIDAE) FROM
THE MIOCENE OF KERN COUNTY, CALIFORNIA
by Hildegarde Howard

In a recent review of avian fossils from the Sharktooth Hill Bonebed in Kern County, California, a humerus representing a small fulmar-like bird has been noted. Although the Family Procellariidae is well represented in the Miocene of California (including Sharktooth Hill) by specimens referable to the genus Puffinus, there is only one Tertiary record of a fulmar. Fulmarus hammeri Howard 1968 from the late Miocene, Monterey Formation in Orange County, California, was described from a carpometacarpus, with a fragmented humerus referred. As the small size of the Sharktooth Hill specimen immediately distinguishes it from the referred specimen of F. hammeri, a new species is herein described.

Fulmarus n. sp.

Holotype.-- Nearly complete left humerus, Natural History Museum of Los Angeles County (LACM) no. 122995, collected by Howell W. Thomas in 1979.

Locality.-- LACM locality 3162, Sharktooth Hill Bonebed, Kern County, California.

Age of Formation.-- Middle Miocene, Round Mountain Silt, Barstovian Land Mammal Age.

Diagnosis.-- Resembling Fulmarus glacialis ^{and F. glacioides} distinguished from the various species of the genus Puffinus by (1) shaft above brachial depression relatively broad laterally and shallow in palmar-anconal dimension; (2) deltoid crest long and having prominent projecting point midway of length; (3) ectepicondylar prominence short and blunt. Distinguished from Fulmarus glacialis ~~(glacioides)~~ by (1) bicipital crest slightly swollen in palmar aspect, relatively longer and with more clearly defined distal extremity; (2) ectepicondylar prominence less raised above distal end of bone (ratio of height of prominence above distal end to length of bone 9.9 percent as compared with 11.5 percent in F. glacialis).

Measurements.-- Greatest length 78.2 mm; breadth of distal condyles 7.1 mm; distance from distal end to proximal surface of ectepicondylar prominence 7.8 mm; lateral dimension of shaft above brachial depression 5.4 mm; palmar-anconal dimension of shaft at same place 3.2 mm.

Reviewed by
Ken Campbell
Nov. 1983

A NEW SPECIES OF FULMAR FROM THE MIOCENE OF
KERN COUNTY, CALIFORNIA (AVES: PROCELLARIIDAE)

By Hildegard Howard

Abstract.-- A new species of fulmar from the Miocene of Kern County, California (Aves: Procellariidae). Bull. Southern California Acad. Sci., Fulmarus miocen^{ae}us n. sp. is described from a humerus found in the middle Miocene, Round Mountain Silt of the Sharktooth Hill Bonebed, Kern County, California, U.S.A. The specimen represents a smaller species than Fulmarus hammeri, the only other Tertiary fulmar recorded from California. It is also smaller than the humerus of Recent species of fulmars and is further distinguished therefrom by a better developed bicipital area and more distally placed ectepicondylar prominence.

INTRODUCTION

on p. 4 it is nearly complete
fragmented
lots of specimens, or few?
on just 3 species?

Among the avian fossils collected in 1979 from the Middle Miocene Sharktooth Hill Bonebed in Kern County, California, was a small, fragmentary humerus ^{bearing similarities} suggesting relationship to ^{those of} the family Procellariidae. This family, which includes the fulmars, petrels and shearwaters, is well represented ^{Sharktooth Hill} in the Bonebed by three species of shearwaters, genus Puffinus. After expert preparation of the fragile humerus, it becomes ^e evident that ~~this~~ specimen represents ^{ed} a species more closely allied to the fulmars than to the shearwaters.

Although the ^{living} ~~Recent species~~ Fulmarus glacialis is recorded (Miller, 1914; ~~and~~ Howard 1949) from the Pleistocene of California, there is only one Tertiary fulmarine record for the state: Fulmarus hammeri Howard 1968, ~~was~~ described from the Monterey Formation (late Miocene) of Orange County. ^{on the original description} The holotype of F. hammeri is ^{the} a proximal end

^a of ^{was named as *halobates* & a} carpometacarpus; ~~with~~ a distal fragment of ^{was} humerus referred ^{to the species}.
The small size of the Sharktooth Hill specimen immediately distinguishes it from the (referred) humerus ^{↓ to} of F. hammeri.

ACRONYMS USED.

LACM -- Natural History Museum of Los Angeles County

USNM -- National Museum of Natural History, Smithsonian Institution

COMPARATIVE MATERIAL AVAILABLE

In addition to the single fossil humeral fragment referred to Eulmarus hammeri (LACM no. 18263), humeri of the following Recent species of Procellariidae were available for comparison with the Sharktooth Hill specimen: Fulmarus glacialis rogersi (7 ^{complete} specimens), F. glacialoides (1), Thalassoica antarctica (1), Daption capense (1), Pagodroma nivea (1), Pterodroma phaeopygia (1), Halobaena caerulea (1), Pachyptila vittata (1), Puffinus creatopus (2), P. pacificus (1), P. griseus (2), and Opisthomelas (11). All specimens of Fulmarus glacialis and ~~of~~ the several species of Puffinus are from the LACM collections; the other Recent material is from USNM.

DESCRIPTION

The humerus (LACM 122995) from the Sharktooth Hill Bonebed is distinguished from this element in the shearwaters (genus Puffinus) by the deltoid crest having a prominent, projecting, hooklike point, the bicipital crest longer and clearly delimited distally, the ectepicondylar prominence short and blunt, the entepicondyle more rounded ^{and} less blade-like in its proximal extension anconally, and the shaft above the brachial depression broad laterally and shallow ^{its} in palmar-anconal dimension.

In these characters resemblance is closest to the humerus of the fulmars, Fulmarus glacialis, ^{and} F. glacialoides, and ^{the petrels,} Thalassoica

antarctica and Daption capense. The humeri ^{of} Thalassoica and Daption, however, are relatively broader proximally and have a marked depression of the shaft immediately below the head, a depression which is not present in the two Recent species of Fulmarus or in the fossil ^{at hand}. Also, in Daption, the point of the deltoid crest is less sharply hooked.

The prominently projecting deltoid crest, with ^{its} hooklike point, is also present in members of the genus Pterodroma. ^{US} P. phaeopygia, ^{the one species of this genus available for comparison, resembles} the shearwaters, however, in the long, pointed ectepicondylar prominence and blade-like proximal extension of the entepicondyle ^{anconally} ^{anconally}. Other petrels, such as Pagodroma nivea, Halobaena caerulea, and Pachyptila vittata, ^{it is} ^{in these species} ^{deltoid crest} although ~~having a more pointed deltoid crest~~ than in the shearwaters, lack the hooklike quality of the point, [←]. The Pagodroma humerus is further distinguished from the fossil by the depression of the shaft below the head. In Pachyptila vittata the bicipital crest is short as in Puffinus, and in Halobaena caerulea the pectoral attachment is longer and narrower than in the fossil humerus, and the ectepicondylar prominence is wider.

Although the characters of the Sharktooth Hill humerus most closely resemble those found in Fulmarus, the differences noted ^{between it and the Recent} ^{are} ^{latter from each other} ^{species of} ^{the genus} more marked than those that distinguish the two Recent species of ~~that genus~~. In view of the similarities noted ^{between} ^{and those} ~~in~~ the humeri of Thalassoica and Daption ~~to that~~ of Fulmarus, it is possible that a distinct, perhaps ancestral, genus is represented by this Miocene bone. With the limited knowledge at hand, however, it is considered advisable to record this single specimen as a new species ^{within} ~~under~~ the genus Fulmarus.

Fulmarus miocenensis n. sp.

Holotype.-- Nearly complete left humerus, Natural History Museum of Los Angeles County no. 122995; collected by Howell W. Thomas in 1979.

Locality.-- LACM locality 3162, Sharktooth Hill Bonebed, Kern County, California.

Formation and age.-- Round Mountain Silt, Middle Miocene, Barstovian Land Mammal Age.

Diagnosis.-- Distinguished from the humerus of Fulmarus glacialis and F. glacialoides by small size (see table) and the following morphological characters: shaft, anconally below head, less acutely angular, with capital shaft ridge more ^{medially positioned} median in position ^{extending less proximally} and less proximal in extent; bicipital crest relatively longer, with ^{which?} contour more evenly rounded and, viewed from palmar side distal termination more clearly marked and bicipital surface more swollen; ectepicondylar prominence less raised above distal end (ratio of height of prominence above distal end to breadth of distal end 82 percent, as compared to 92-95 percent in F. glacialis and 102 percent in F. glacialoides). Distinguished from humerus of Miocene species, Fulmarus hammeri, by smaller size (height of ectepicondylar prominence 7.8 mm above distal end as compared to 13.0 mm in F. hammeri).

Measurements.-- See Table 1.

distal end of humerus or ectepicondylar prominence?

CONCLUSION

With the addition of
 The new species, Fulmarus miocenus, ^{n. sp.} brings the total number
 of avian species described from the Sharktooth Hill Bonebed ^{now stands} to
 at nine, ^{with four} and ~~adds a fourth~~ species ^{of} to the Family Procellariidae ^{being described} named
 from this locality. The other members of the family are the
 shearwaters Puffinus inceptor Wetmore 1930, P. priscus Miller 1961
 and P. mitchelli Miller 1961.

Although the Family Procellariidae is well represented in
 the Tertiary fossil record by the genus Puffinus, the ~~Sharktooth~~ ^{Fulmarus miocenus}
 Hill specimen, ~~here described~~ ^{is only} is only the second species of
 fulmar to be described, and ^{only} the third fulmarine record for the
 Tertiary. In addition to Fulmarus hammeri from the Miocene of
 Orange County, California, Fulmarus sp. was recorded from the
 Miocene of Maryland (Wetmore 1926) on the basis of ^{the} a shaft of a
 humerus said to resemble Fulmarus glacialis in "size and structure."
 The Maryland specimen is presumably too large to be attributable
 to Fulmarus miocenus.

ACKNOWLEDGMENTS

TABLE I

Measurements (in millimeters) of Humeri of Fulmarus miocenCompared with those of Recent Species of Fulmarus

	<u>F. miocen</u> Holotype	<u>Fulmarus glacialis</u> 7 specimens min. max.	<u>F. glacialoides</u> USNM 491469 2 specimens 100656
Greatest length	78.3	98.6 106.7	106.9 107.8
Proximal breadth ¹	13.0	16.0 17.0	18.0 18.6
Greatest breadth of distal end	9.5	11.7 12.7	12.7 12.9
Height of ectepicondylar prominence above distal end ³	7.8	11.0 11.7	13.0 13.4
Length of deltoid crest, from head	20.4	24.7 27.5	28.2 28.5
Length of bicipital crest, from head	15.2	16.9 18.4	19.7 20.2
Breadth of shaft ²	5.4	6.7 6.8	8.0 8.0 - same as → 4.8 - USNM
Depth of shaft ²	3.2	3.8 4.0	4.8 4.8
	12.3	15.9	18.0 18.2

¹ Proximal breadth measured from external tuberosity to below tip
of internal tuberosity

² Breadth and anconal-palmar depth of shaft measured just above
brachial impression

³ This measurement in F. hammer is 13.0

No measurements of F. hammer?

Ht of ectepicondyle
prominence above

distal end 12.8 mm 13.2
depth^{ext} distal condyle 9.1 20%

mini. max
glac. 7.0-7.8

See next page
for added meas

by the middle of lower posterior scan

5.2 / 4.0

(672) 6.3 / 5.0

618 6.2 / 4.0

626 7.0 / 4.2

27 6.4 / 5.0

619 6.3 / 5.2

7 glauco

7490 7.8
" 5.8

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for enlarged mg add
 1952 Oshodunham
 Howard 1966 + 1978 (T Cedros re mg, opusculum)
 Mitchell 1965
 Waufer 1976
 A. Miller 1944
 L Miller 1958 and 1952
 Cheneval 1983
 Olson in press
 Broadbent 1961 opusculum

Daphnia capensis ? ~~Pukania~~ ~~Pukania Bay~~ Wellington West N.Z.

Pukania Bay

		1088.8	489493	Thalassira ss432	489514
		84.2	86.7	not only	96.0
Greatest length	Daphnia capensis				16.9
max br		14.4	15.4	18.0	12.2
ant br		10.3	10.5		12.5
st uclips		10.4	10.8		23.8
		21.1	24.3	27.7	18.8
deltoid lobe to head		15.5	16.2	19.5	7.4
br to above brachial lobe		6.2	6.5		4.5
br to above brachial lobe		3.5	3.4		
depth sh					
gr br across brachial lobe		14.2	14.6	17.3	16.1

Kalobacua caerulea very deep brachial inflexion + heavy, blunt
 estepicord prom. Head undercut
 Pachyphala r. also deep brachial inflexion and undercut head

~~not diagnostic~~
 Lost Brachial lobe extends far to uclips as in Fulmar
 ^ and Pachyphala ~~not as extensive as Thalassira~~
 " Daphnia most like Fulmar glaucous
 Daphnia deeper brachial dip

A A P G

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Fulmar n. sh
negative Photos

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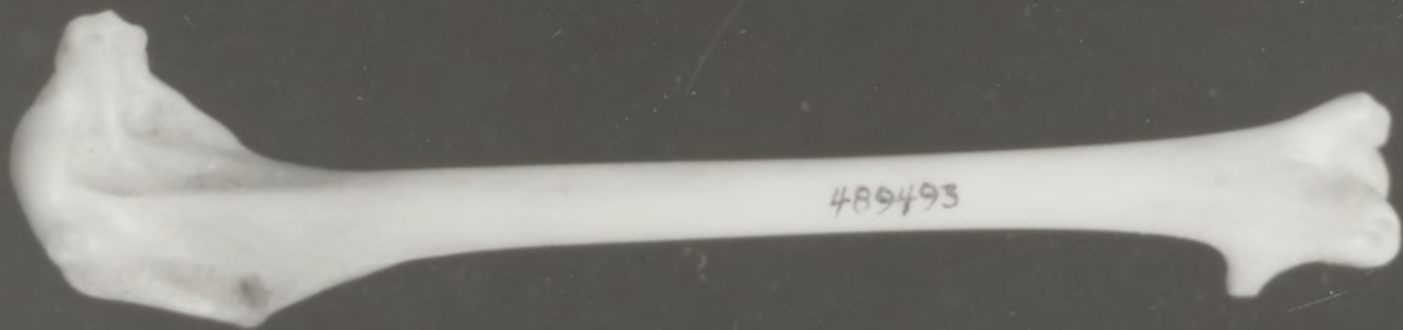
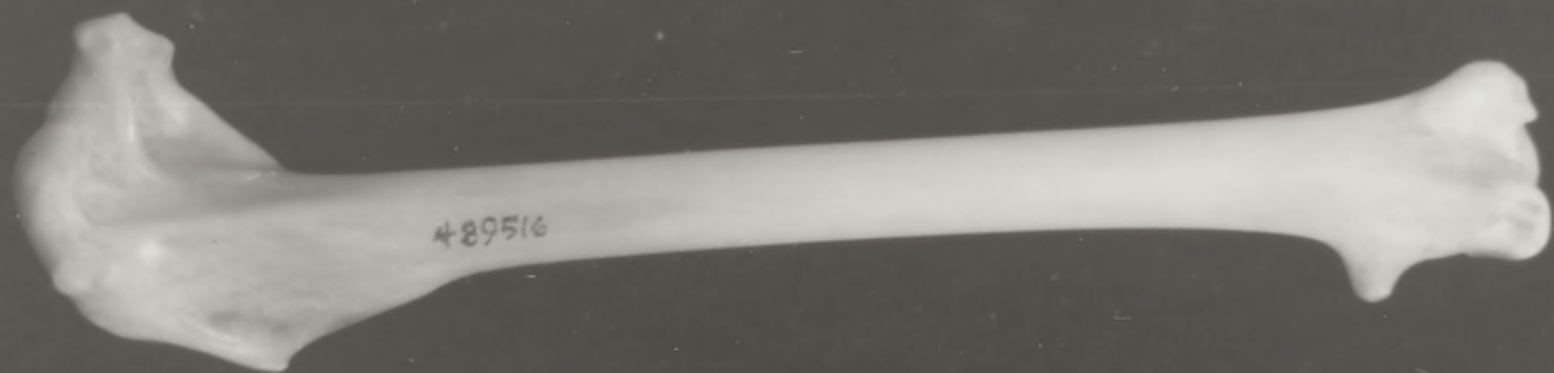
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Left - Daptin capense

Right Thalassocera antarctica

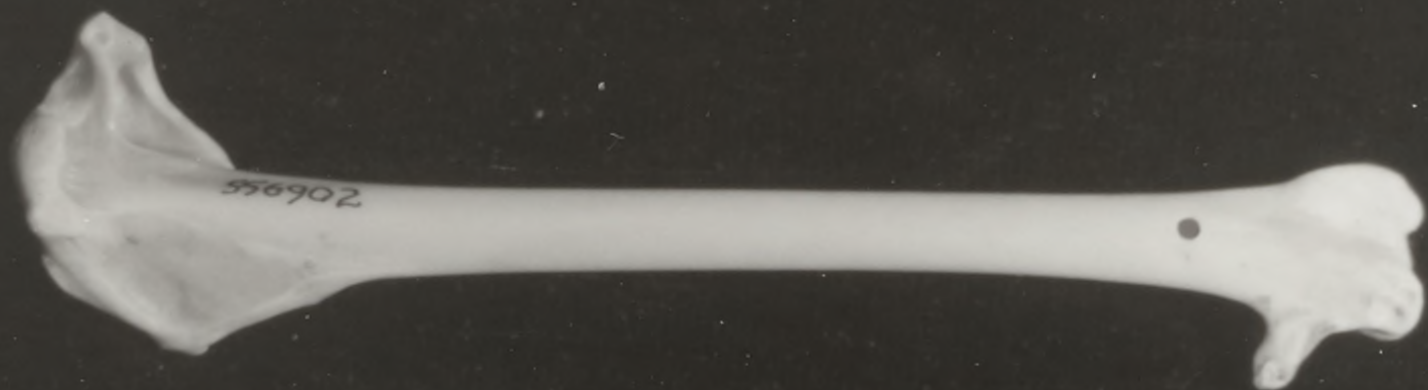


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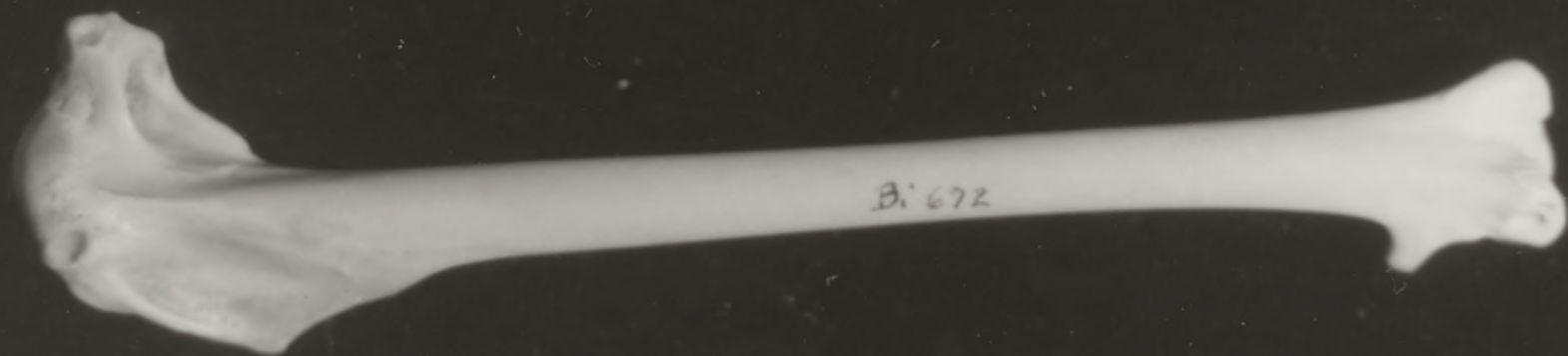
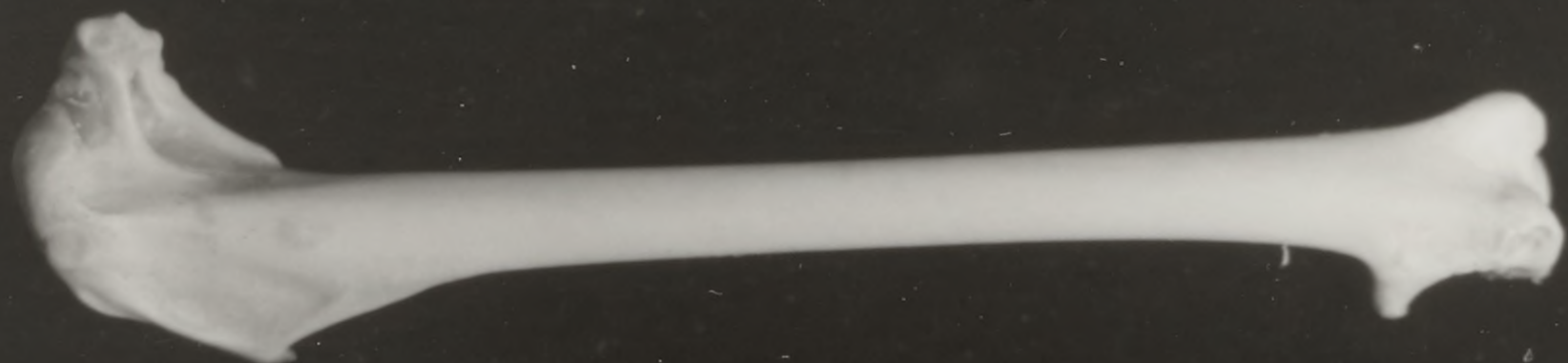
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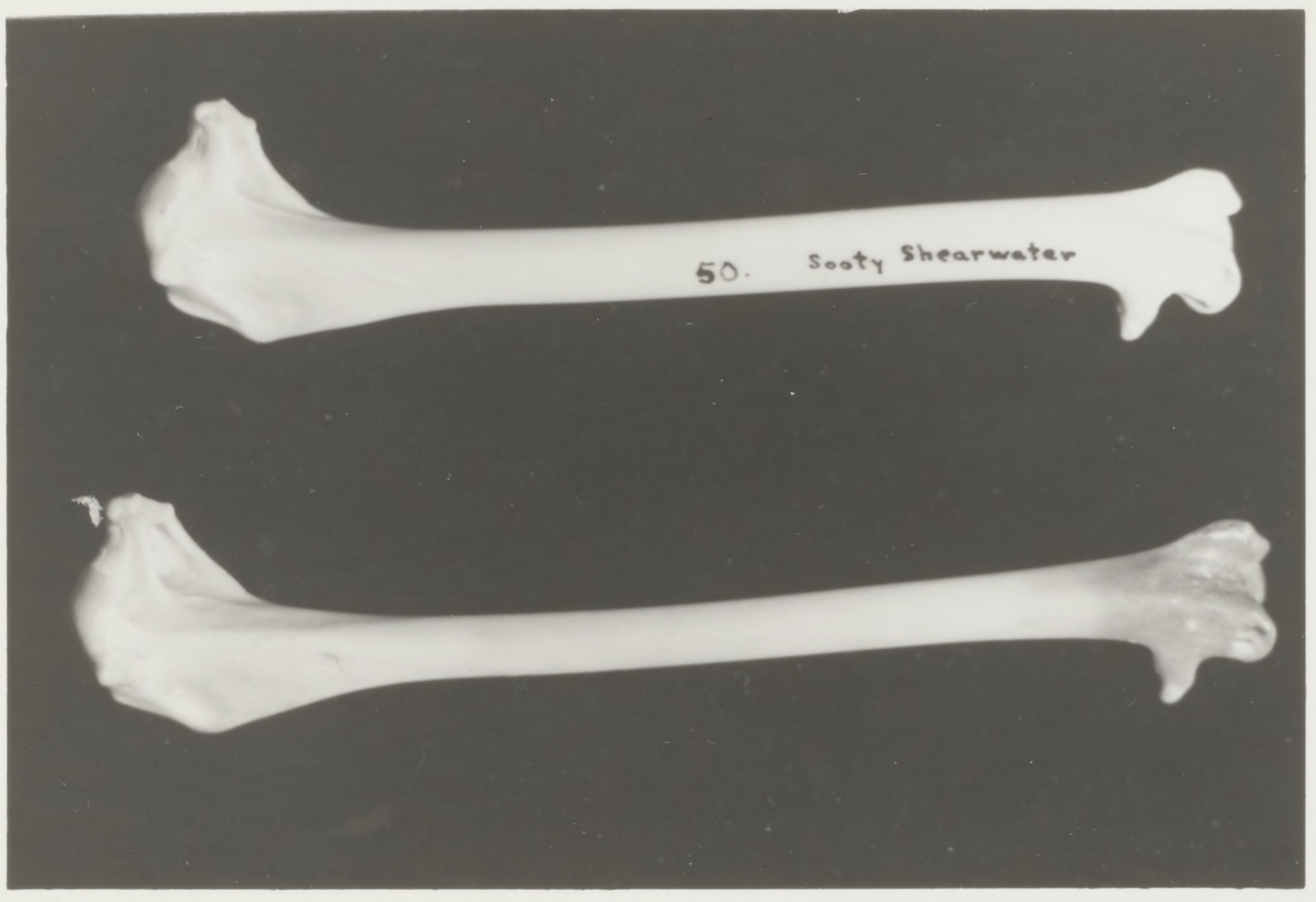
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Daphnia capensis



Right Pterodroma phaeopygia





50. Sooty Shearwater

This is a black and white photograph of two long bones, likely from a bird, laid out horizontally against a dark background. The top bone is marked with the number '50.' and the text 'Sooty Shearwater'. Both bones show a distinct proximal end with a large, rounded, and somewhat irregular shape, and a distal end that is more slender and tapers slightly. The bones are light-colored, contrasting sharply with the dark background.

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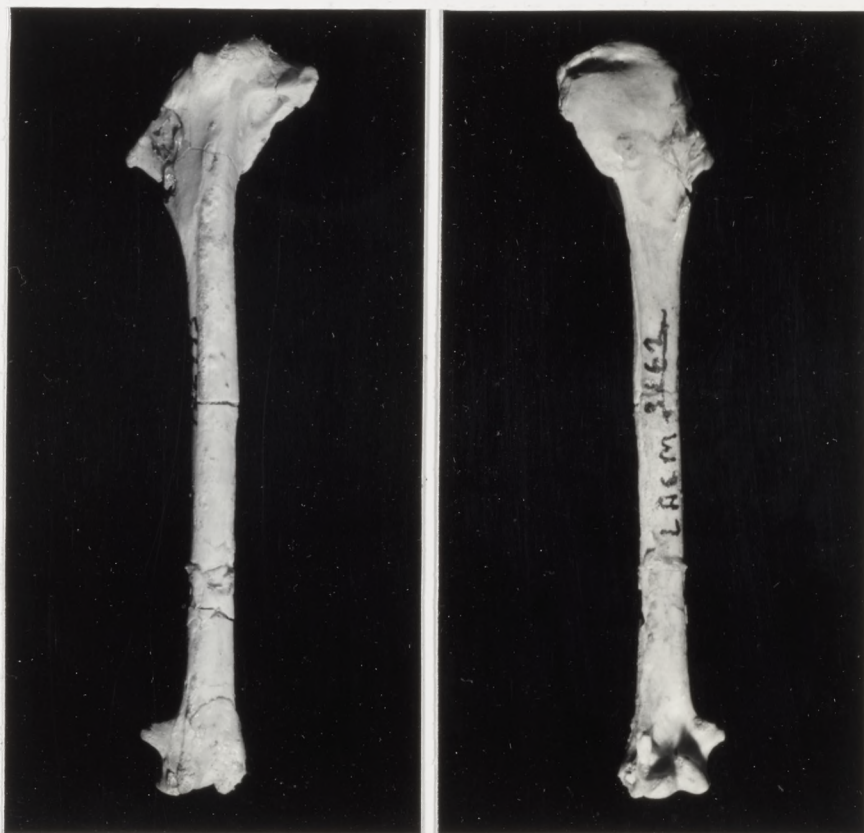
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ADDITIONAL AVIAN RECORDS FROM THE MIOCENE OF KERN COUNTY, CALIFORNIA
WITH THE DESCRIPTION OF A NEW SPECIES OF FULMAR (AVES:PROCELLARIIDAE)

By Hildegarde Howard

Abstract.---Additional avian records from the Miocene of Kern County, California with the description of a new species of fulmar Bull. Southern California Acad. Sci., 8 (): (Aves:Procellariidae) by Hildegarde Howard. ^ Previously unrecorded avian taxa from the middle Miocene Sharktooth Hill Bonebed in Kern County, California are listed: Fulmarus n. sp., Osteodontornis ?orri, Ciconiidae gen. and sp. to be determined, and Megapaloelodus sp. Fulmarus miocaenus n. sp. is described from a humerus representing a smaller species than F. hammeri, the only other Tertiary fulmar recorded from California. It is also smaller than humeri of Recent species of fulmars and is further distinguished therefrom by a better developed bicipital area and more distally placed ectepicondylar prominence.

Introduction

The middle Miocene marine deposits of the Sharktooth Hill Bonebed in Kern County, California were discussed in detail by Mitchell (1965). His listing of the fauna recovered from these beds (sharks, bony fishes, reptiles, birds and mammals) included the following birds:

Albatross--Diomedea californica Miller 1962

Shearwaters--Puffinus inceptor Wetmore 1930, P. priscus

Miller 1961, P. mitchelli Miller 1961

Gannets--Morus vagabundus Wetmore 1930, Morus sp. (Miller, 1961)

Waterbirds--Presbychen abavus Wetmore 1930, Branta sp.

(Miller 1961)

Shorebirds--Recurvirostra sp. (Miller 1961)

As collecting continued in the years following Mitchell's report, a second albatross, Diomedea milleri Howard 1966, and an osprey, Pandion homalopteron Warter 1976, were added.

The collections at the Natural History Museum of Los Angeles County now contain over 120 unrecorded avian specimens from Sharktooth Hill. Included among these are representatives of four taxa not noted in the above listing:

Order Procellariiformes, Family Procellariidae (Shearwaters, et al)

Genus Fulmarus, n. sp. (Fulmar)

(Bony-toothed Birds)

Order Pelecaniformes, Family Pseudodontornithidae ^

Genus Osteodontornis, species ?orri Howard 1957

Order Ciconiiformes, Family Ciconiidae (Storks)

Genus and species to be determined

Order Charadriiformes, Family Phoenicopteridae (Flamingos)

Genus Megapaloelodus A. Miller 1944, species ?

The present paper concerns the description of Fulmarus n. sp. The material representing the other taxa is under study and discussion thereof will be presented at a later date.

Methods and Materials

Acronyms used

LACM--Natural History Museum of Los Angeles County

USNM--National Museum of Natural History, Smithsonian Institution

Comparative material available

Fossil: Distal fragment of humerus (LACM 18263) referred to Fulmarus hammeri.

Recent: Humeri of Fulmarus glacialis rodgersi (7), F. glacialoides (2), Thalassoica antarctica (1), Daption capense (2),

Pagodroma nivea (1), Pterodroma phaeopygia (1), P. lessoni (1), Halobaena caerulea (2), Pachyptila vittata (2), Puffinus creatopus (2), P. griseus (2), P. opisthomelas (11), P. pacificus (1). All specimens of Fulmarus glacialis, one each of F. glacialisoides, Daption capense, Halobaena caerulea, Pterodroma lessoni, Pachyptila vittata and all of the several species of Puffinus are from the LACM collections; the other Recent material was loaned by USNM.

Description

Among the avian fossils collected from Sharktooth Hill in 1979 was a small, fragmented humerus (LACM 122995) bearing similarities to those of the family Procellariidae. This family, which includes the fulmars, petrels and shearwaters, is represented at Sharktooth Hill by more than 30 bones of the shearwaters, genus Puffinus. After expert preparation of the fragile LACM 122995 humerus, it became evident that the specimen represented a species more closely allied to the fulmars than to the shearwaters.

Although the living Fulmarus glacialis is recorded from the Pleistocene of California and Norway (Brodkorb 1963, p. 245), there are only two Tertiary records of the genus. Both are of Miocene age. Only one of these was described; F. hammeri Howard 1968 from Orange County, California, with holotype carpometacarpus and referred distal fragment of humerus. The other, a portion of the shaft of a humerus, from Maryland, was recorded as Fulmarus sp. (Wetmore 1926). Both represent species of larger size than that represented by the specimen from Sharktooth Hill.

Generic Analysis

Humerus LACM 122995 is distinguished from this element in the shearwaters (genus Puffinus) by the deltoid crest having a prominently projecting, hooklike point, the bicipital crest longer and clearly delimited distally, the ectepicondylar prominence short and blunt, the entepicondyle more rounded and less bladelike in its proximal extension anconally, and the shaft above the brachial depression broad laterally and shallow in its palmar-anconal dimension.

In these characters resemblance is closest to the humerus of the fulmars, Fulmarus glacialis and F. glacialoides, and the petrels, Thalassoica antarctica and Daption capense. The humeri of Thalassoica and Daption, however, are relatively broader proximally and have a marked depression on the anconal surface of the shaft immediately below the head, a depression which is not present in the two Recent species of Fulmarus or in the fossil at hand. Also, in Daption, the point of the deltoid crest is less sharply hooked.

The prominently projecting deltoid crest, with its hooklike point, is also present in members of the genus Pterodroma. The two species of this genus available for comparison (P. phaeopygia and P. lessoni), however, resemble the shearwaters in the long, pointed ectepicondylar prominence and blade-like proximal anconal extension of the entepicondyle. Other petrels, such as Pagodroma nivea, Halobaena caerulea and Pachyptila vittata, lack the hooklike quality of the deltoid crest, although it is more pointed in these species than in the shearwaters. The Pagodroma humerus is further distinguished from the fossil by the depression

of the shaft below the head. In Pachyptila vittata the bicipital crest is short as in Puffinus, and in Halobaena caerulea the the pectoral attachment is longer and narrower than in the fossil humerus, and the ectepicondylar prominence is wider.

Although the characters of the Sharktooth Hill humerus most closely resemble those found in Fulmarus, the differences noted between it and the Recent species of the genus are more marked than those that distinguish the latter from each other. In view of the similarities noted between the humeri of Thalassoica and Daption and those of Fulmarus, it is possible that a distinct, perhaps ancestral, genus is represented by this Miocene bone. With the limited knowledge at hand, however, it is considered advisable to record this single specimen as a new species within the genus Fulmarus.

Fulmarus miocaenus n. sp.

Holotype.-- Nearly complete left humerus, Natural History Museum of Los Angeles County no. 122995; collected by Howell W. Thomas in 1979.

Locality.-- LACM locality 3162, Sharktooth Hill Bonebed, Kern County, California.

Formation and age.-- Round Mountain Silt, middle Miocene, Barstovian Land Mammal Age. ✓

Diagnosis.-- Distinguished from the humeri of Fulmarus glacialis and F. glacialoides by small size (Table 1) and the following morphological characters: shaft anconally below head less acutely angular, with capital shaft ridge more median in position and less proximal in extent; bicipital crest relatively longer with internal and distal contours more evenly rounded and distal termination more clearly marked; ~~and~~ bicipital surface more swollen viewed from palmar side; ectepicondylar prominence less raised above distal end of

humerus (ratio of height of prominence above distal end of humerus to breadth of distal end, 82 percent, as compared to 92-95 percent in F. glacialis and 102 percent in F. glacialoides). Distinguished from humerus of Miocene species F. hammeri by smaller size (distance from distal end of humerus to base of ectepicondylar prominence 7.8 mm, depth of external condyle 5.8 mm; same measurements in the humerus of F. hammeri 13.0 mm and 9.1 mm respectively).

Measurements compared with living species of Fulmarus:

Table 1.

Discussion.-- The Maryland record of Fulmarus sp. (Wetmore 1926) is based on a fragment of the shaft of a humerus (USNM 237160) between the nutrient foramen and the lower half of the deltoid crest. It was placed in the genus Fulmarus on the basis of the high elevation of the nutrient foramen and general similarity and size with respect to the humerus of F. glacialis. Size alone precludes referral to F. miocaenus; breadth of shaft immediately below the deltoid crest in F. miocaenus 5.0 mm, depth of shaft at the same place 4.0 mm; the same measurements on USNM 237160, according to Storrs Olson of USNM, who examined the fragment for me, are 5.8 mm and 4.7 mm respectively--close to the minimum of the F. glacialis humeri at hand (5.7 mm breadth, 4.7 mm depth). Furthermore, Olson notes that the specimen preserves no diagnostic features that could be used in comparison with the holotype of F. miocaenus, and should probably now be classified only as "Procellariidae, gen. and sp. indet."

Conclusion

Fulmarus miocaenus n. sp. is the ninth species to be described from the Sharktooth Hill Bonebed, and the fourth species of the family Procellariidae named from this middle Miocene site. The other members of the family are the shearwaters Puffinus inceptor, P. mitchelli and P. priscus. Although the shearwaters are well represented in the Tertiary fossil record, Fulmarus miocaenus is only the second species of fulmar to be described, and only the third fulmarine record for the Tertiary. In addition to P. hammeri described from the Miocene of Orange County, California, Fulmarus sp. was recorded from the Miocene of Maryland. Based on a fragment of humeral shaft, the generic assignment of the Maryland specimen is now questioned.

Whether the species represented by the additional families herein recorded from the Bonebed--Pseudodontornithidae, Ciconiidae and Phoenicopteridae--are assignable to species previously described from other fossil sites, or represent species new to science is yet to be determined.

Acknowledgments

I wish to thank Howell W. Thomas for his gift to the Natural History Museum of Los Angeles County of fossils that he collected at the Sharktooth Hill site, which included the specimen here named as holotype of Fulmarus miocaenus n. sp.

I am grateful to the following palaeornithologists for helpful suggestions after reading an earlier draft of this paper: Pierce Brodkorb, Kenneth E. Campbell Jr. and Storrs L. Olson. I also want to thank Dr. Olson for arranging the loan of skeletons from the National Museum of Natural History and for examining the "fulmarine" specimen from the Miocene of Maryland for me.

My thanks go to my husband, Henry Anson Wylde, for his painstaking care in photographing the fragile holotype of Fulmarus miocaenus, and to ^{Dick}Richard Meier, LACM Photographer, for preparing the excellent prints.

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TABLE I

Measurements (in millimeters) of Humeri of Fulmarus miocaenus
 Compared with those of Recent Species of Fulmarus

	<u>F. miocaenus</u> Holotype	<u>Fulmarus glacialis</u> 7 specimens	<u>F. glacialis</u> USNM 491469 LACM 100856		
		min.	max.		
Greatest length	78.3	98.6	106.7	106.9	107.8
Proximal breadth ¹	13.0	16.0	17.0	18.0	18.6
Greatest breadth of distal end	9.5	11.7	12.7	12.7	12.9
Height of ectepicondylar prominence above distal end of humerus	7.8	11.0	11.7	13.0	13.6
Length of deltoid crest, from head	20.4	24.7	27.5	28.2	28.5
Length of bicipital crest, from head	15.2	16.9	18.4	19.7	20.2
Breadth of shaft ²	5.4	6.7	6.8	8.0	8.0
Depth of shaft ²	3.2	3.8	4.0	4.8	4.8

¹Proximal breadth measured from external tuberosity to below tip
 of internal tuberosity

²Breadth and anconal-palmar depth of shaft measured just above
 brachial impression

Legend for figure 1.

Fig. 1. Holotype humerus (LACM 122995) of Fulmarus miocaenus

n. sp. Left, anconal view; right, palmar view.

~~Enlarged:~~ greatest length=78.3 mm

Fig. 1

TOR



Left



Right

trim space top + bottom and
cut to fit width of page